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| 92556 | 7590 | 02/15/2012 | EXAMINER | |
| HONEYWELL/HUSCH | | | DINH, BACH T | |
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| | | | 02/15/2012 | |
| | | | ELECTRONIC | |

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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|------------------------------|--------------------------------------|--|--|
| Office Action Summary | Application No. 10/591,188 | Applicant(s) WILLIAMSON ET AL. | |
| | Examiner BACH DINH | Art Unit 1724 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 February 2012.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on ____; the restriction requirement and election have been incorporated into this action.
- 4) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 5) ☒ Claim(s) 1-19 is/are pending in the application.
- 5a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 6) ☐ Claim(s) ____ is/are allowed.
- 7) ☒ Claim(s) 1-19 is/are rejected.
- 8) ☐ Claim(s) ____ is/are objected to.
- 9) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 10) ☐ The specification is objected to by the Examiner.
- 11) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 12) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. ____. |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Summary

1. This is the response to the communication filed on 02/06/2012.
2. Claims 1-19 remain pending in the application.
3. The application is not in condition for allowance.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
 2. Ascertaining the differences between the prior art and the claims at issue.
 3. Resolving the level of ordinary skill in the pertinent art.
 4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
6. Claims 1-11 and 13-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Marrese et al. (US 4,769,122) in view of Yamada et al. (US 6,410,189).

Addressing claims 1-8, 11, 13-17 and 19, Marrese discloses an electrochemical gas sensor (figure 2) comprising:

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A working electrode 50 comprising a gas porous membrane and a catalyst layer formed on one side of the membrane (col. 8 line 55 to col. 9 line 10 or 8:55-9:10); and

A counter electrode 24 that includes a catalyst (9:11-21);

Electrolyte (32 and 34 are wicking materials that absorb electrolyte) in contact with the catalyst both of the working electrode and of the counter electrode (figure 2); and

A support which is one of rigid or semi-rigid (elements 64, 72, 70, 52 and 58 constitute the support) constitute the rigid or semi-rigid support in contact with and presses against a side of the working electrode remote from the electrolyte (figure 2) to compresses the electrodes and the electrolyte together (in figure 2, the screw 64 urges the element 58 of the support downward, which presses the electrodes and the electrolyte together; additionally, Marrese discloses vent holes 114 and 115 are provided for gas to escape due to the swelling of the electrolyte, 8:23-46, which also causes the swelling of the wicks 32 and 34 that push against the working and counter electrodes; therefore, in the event the wicks 32 and 34 push against the working and counter electrodes, the elements 52, 58, 70 and 74 of the support prevent the electrodes from moving out of place by exerting a force that counteracts the force created by the swelling of the wicks or compressing the electrolyte in the wicks and the electrodes together);

The support defines a plurality of open areas 68 allowing gas to contact the membrane (9:63-66); furthermore, the element 58 that has the open areas 68 provides electrical contact to the electrode (6:28-51).

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Marrese is silent regarding the support having a thickness of only approximately 0.1 mm and the surface area of the support between the open areas being less than 40% of the combined area of the open areas and that portion of the support between them.

Yamada discloses a current collector for an electrode in an electrochemical device (abstract), which performs the same function as the conductive element 58 of Marrese.

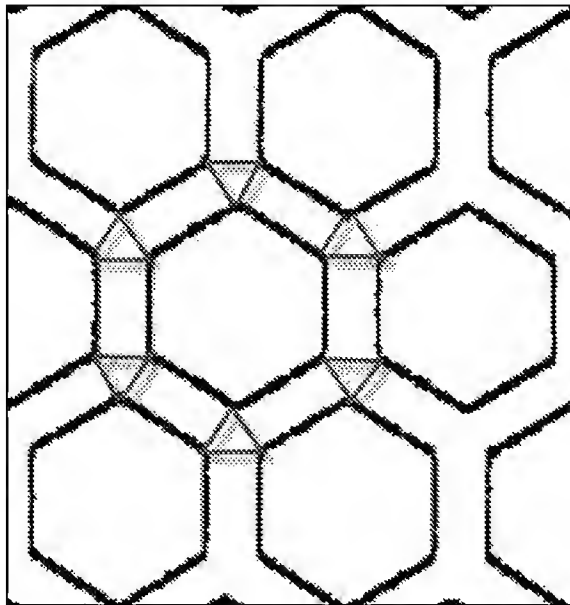
Furthermore, the current collector of Yamada has a thickness of 100 microns or only approximately 0.1mm (5:37-39) and defines a plurality of open areas (figure 5) and the surface area of the portion of the support between the open areas being less than 40% of the combined surface area of the open areas and that portion of the support between them according to the following calculations. The dimension **a** is 0.1 to 5 mm and the dimension **b** is 0.1 to 5 mm, for the calculation, assuming **a** is 4 mm and **b** is 0.1 mm and the area in figure 5 below is used as an example. The area of the hexagon is calculated by equations $((3\sqrt{3})/2)*L^2$ or $(\sqrt{3}/2)*W^2$ (according to

<http://homepage.mac.com/terhorab/iblog/B1032916816/C181698761/E174145342/Media/hexagonArea.pdf>) where L is the side length and W is the width between two parallel

sides of the hexagon. The area of the portion between the hexagons are divided into a plurality of equilateral triangles with each side equals to the dimension **b** and rectangles with the width equals to the dimension **b** and the length equals to the side of the hexagon or half of the dimension **a** according to the source above. Thus, the area for each hexagon is 10.39 mm^2 , the area for each rectangle is 0.2 mm^2 and the area for each triangle is 0.0043 mm^2 . The section of figure 5 below has 7.5 hexagons, 20.5 rectangles and 15 triangles; therefore, the total area of the section of figure 5 below is 82.09 mm^2

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and the percentage of surface area of the portion between the hexagons and the total area of the section below is 5.073%.



At the time of the invention, one with ordinary skill in the art would have found it obvious to modify the current collector 58 of Marrese to have the hexagonal openings with the dimensions for the current collector of Yamada or by substituting with the current collector of Yamada because the current collector with the dimensions of Yamada provides electrical connection to the sensing electrode with the openings that allow the diffusion of incoming gas as required by Marrese as well as having low combined resistances and reducing the average current migration lengths within the current collector (Yamada, 2:30-37).

Addressing claim 9, Marrese discloses the reference electrode 42 (5:55).

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Addressing claims 10 and 18, Marrese discloses the portion 58 of the support is conductive (6:28-31) and is flexible (figure 5, the portion 58 is bent in the portion 62).

Marrese is silent regarding the portion 58 being metallic; however, it is well known in the art that metallic materials are conductive.

Yamada discloses the current collector is made of aluminum foil (3:51-60), which is conductive and flexible.

At the time of the invention, one with ordinary skill in the art would have found it obvious to modify the conductive portion 58 of Marrese with the aluminum foil material of Yamada because substituting the known conductive material of Marrese with the conductive aluminum material of Yamada to obtain the predictable result of conducting electrical current to and from the electrode is a matter of obviousness (KSR decision, rationale B, MPEP 2141).

7. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Marrese et al. (US 4,769,122) in view of Yamada et al. (US 6,410,189) as applied to claims 1-11 and 13-19 above, and further in view of Kiesele et al. (US 5,372,696).

Addressing claim 12, Marrese discloses the sensor includes a housing (55 and 8, figures 2-3), and wherein the portion 72 of the support includes a rim that is adhesively bond to the housing (figure 2, 6:52-61).

Kiesele discloses an electrochemical sensor like that of Marrese; wherein, the diffusion diaphragm 11 is attached to the housing 4a by either adhesive or welding (3:17-20).

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At the time of the invention, one with ordinary skill in the art would have found it obvious to modify the sensor of Marrese by welding the rim 72 of the support to the housing instead of using adhesive because according to Kieseles, substituting the known adhesive of Marrese for welding would still produce the predictable result of attaching the portion 72 of the support to the housing (Kieseles, 3:17-20, KSR decision, rationale B, MPEP 2141).

Response to Arguments

8. Applicant's arguments filed 02/06/2012 have been fully considered but they are not persuasive for the following reasons:

a. With regard to Applicant's argument about the limitation "the support having a thickness of only approximately 0.1mm" is functional on a number of different levels. The argument is not persuasive because claims are drawn to the structure of the gas sensor. The MPEP states "while features of an apparatus may be recited either structurally or functionally, claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than function" and "A claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim" (MPEP 2113). In instant situation, Yamada discloses the metallic layer with the thickness of only approximately 0.1 mm, which satisfies all of the structural requirements of the claim;

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therefore, the argument drawn to the function of the support does not structurally differentiate the claimed support from that of Yamada.

b. With regard to Applicant's argument about "on another level, those of skill in the art would understand that the claimed thickness is structural", Examiner agrees with Applicant's argument. However, Applicant's argument does not negate the fact that Yamada discloses all the require structure, including the claimed thickness, of the support.

c. Additionally, Applicant is respectfully reminded that Examiner did not state only the metallic layer having the thickness of 0.1 mm of Yamada is the claimed support. On page 2 of the previous Office Action, Examiner stated elements 64, 72, 70, 52 and 58 constitute the support and the discussed modification only involved the element 58 of Marrese.

d. For the reasons above, Examiner maintains the position that claims 1-11 and 13-19 are obvious over the disclosures of Marrese in view of Yamada.

Applicant's argument regarding the rejection of claim 12 is not persuasive because the arguments regarding the rejections of claims 1-11 and 13-19 are not persuasive.

Conclusion

9. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

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A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to BACH DINH whose telephone number is (571)270-5118. The examiner can normally be reached on Monday-Friday EST 7:00 A.M-3:30 P.M.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Keith Hendricks can be reached on (571)272-1401. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

BD

02/09/2012

/Keith D. Hendricks/

Supervisory Patent Examiner, Art Unit 1724